Sample pages from the Pearson BTEC Tech Award
Digital Information Technology Student Book 2nd Edition

The following sample pages give you an overview of the approach and depth of treatment you can expect from the book and the various learning features the book contains.

Over the page you will find eight sample pages of Component I, Learning outcome A. The features presented here include some or all of the following items:

Introduction
A broad introduction to the Component, highlighting why the topics covered are important for learners to understand, and how the knowledge and skills developed can be applied in the real world of work.

Learning outcomes
A brief statement of the outcomes as given in the official Pearson specification.

Getting started
A short activity or discussion that will introduce learners to what they will be covering in the lesson.

Key terms
Important words or terms are defined.

Activity
These will help learning about the topic. Learners may be asked to work in pairs, groups or on their own.

Check my learning
This is an opportunity for learners to check back over what they should have learned. It may be a discussion or homework activity.

Did you know?
These include interesting facts that relate to what is being learned, to maintain learner engagement and interest.

Best practice
Hints and tips to embed good or best practice in a real-world or workplace context, to add a workplace dimension and make learning relevant to practice.

The content of this second edition has been thoroughly revised and updated to ensure alignment with the new specification and assessment arrangements for the 2022 BTEC Tech Award qualification.

Important note: These sample pages are taken from early proofs of the book, so may not reflect the exact contents that will be contained in the published book. The published book may include amendments or adjustments made during final proofreading.

Pearson BTEC
Tech Award Level 1/2 (2022)
Digital Information Technology

Matched to the 2022 specification

Student Book

L1/2

2nd Edition

Introduction to user interfaces

A **user interface** is the software that sits between humans and devices. It allows the user to operate a device to carry out tasks.

What is a user interface?

A user interface is the **software** that you can see when using a device. It allows you to respond to a device by entering information. This can include using a mouse, keyboard or touchscreen. You can now also use sound with some modern devices, where you enter commands by using your voice.
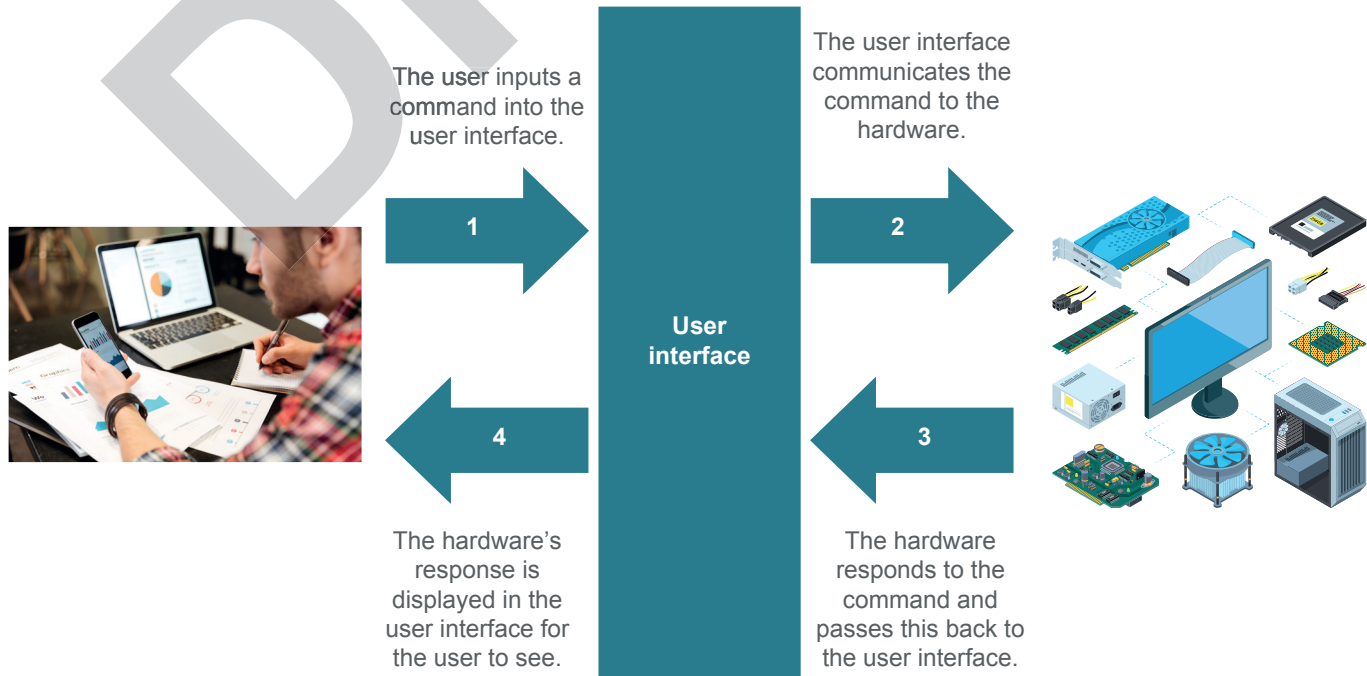
The user inputs a command into the user interface.

The user interface communicates the command to the hardware.

User interface

1

2

4

3

The hardware's response is displayed in the user interface for the user to see.

The hardware responds to the command and passes this back to the user interface.

◧ Figure 1.1: What device do you regularly use? Apply the diagram to your device.

Example uses of user interfaces

User interfaces are installed across a vast range of different devices. Table 1.1 gives some examples of devices with user interfaces.

◧ **Table 1.1: The different uses of user interfaces**

Type of device	Definition	Example devices with a user interface
Computers	These are general computers that are used within the home or workplace. They usually consist of the computer itself, a monitor, mouse, keyboard and speakers.	• Desktop computers • Laptop computers
Handheld devices	These are small devices that are usually portable (can be carried easily). All of the components such as the screen and speakers are integrated into the device.	• Smartphones • Tablets • Laptops • E-readers
Entertainment systems	These are devices that are often used in the home for leisure activities.	• Game consoles • Home theatre systems
Domestic appliances	These are devices that help us to complete household tasks. We usually have many domestic appliances in our homes. Each one needs a user interface to be able to use it.	• Air conditioners • Dishwashers • Tumble dryers • Fridge-freezers • Washing machines • Microwave oven
Controlling devices	These are devices that are used to control other devices automatically. Controlling devices usually sit in the background. We may only interact with them once or twice a day.	• Security lights • Central heating controller
Embedded systems	These are much smaller computer systems that sit inside a larger system.	• Electronic parking meters • Traffic lights • Vending machines • Smartwatches/digital wristwatches • Robotic vacuum cleaners

Basic user interfaces

There are many different types of user interface. In this lesson you will explore text-, forms- and menu-based interfaces.

Text interfaces

A text interface works by the user entering specific commands with the keyboard. When these have been entered, the user interface will then respond with an output.

Features of text interfaces
- The user interface is made up of text and does not contain any graphics.
- The user enters commands with a keyboard. Commands need to be spelt correctly, otherwise the text interface will not understand them.
- The user interface will respond instantly with an output.
- Text interfaces do not require powerful hardware as they don't contain graphics.
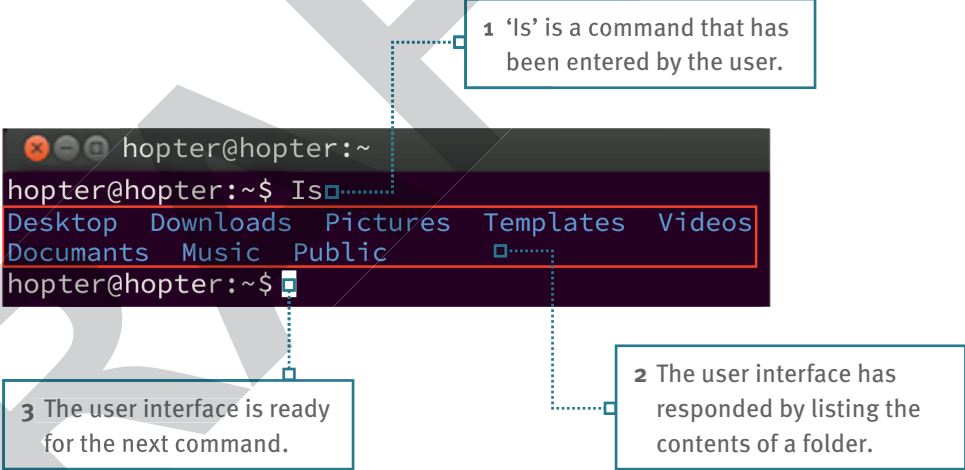
1 'ls' is a command that has been entered by the user.

```
hopter@hopter:~
hopter@hopter:~$ ls
Desktop   Downloads   Pictures   Templates   Videos
Documants   Music   Public
hopter@hopter:~$
```

2 The user interface has responded by listing the contents of a folder.

3 The user interface is ready for the next command.

◪ **Figure 1.2: How would you feel if every device you used had a text interface? What impact would that have?**

When would text interfaces be used?

Text interfaces would be designed and used by experienced users who know all of the commands. They are often used by computer technicians when trying to solve problems with computer systems. This is because they are quick and can go directly to a specific location rather than going through lots of different menus.

Form interfaces

A form interface works by the user entering information using various **form controls**.

Features of form interfaces
- The user interface usually takes up a small part of the screen.
- It allows the user to enter information.
- It includes labels so the user knows what the different parts of the form means.
- It uses form controls such as buttons, tick boxes and drop-down lists to enter information. These are often used to input data into a database.

When would form interfaces be used?

Form interfaces are used when you know what kind of data you want the user to enter. For example, if you want to add a friend to your contacts list, you will enter their first name, surname and telephone number. Form interfaces are also used when data needs to be inserted into a device in a specific order. For example, when buying a product online you select which product you want and then how many you want.

Menu interfaces

A menu interface is a way of selecting options by clicking on a graphic on the device screen.

Features of menu interfaces
- The user interface displays a list of options for the user to select. The user uses the mouse cursor or touches the screen to select an option.
- It can pop down, pop up, pop across or take up the whole screen.
- It can be cascading, which means when the user selects an item, another sub menu can appear.
- All options listed within a single menu are usually related to each other.

New Contact
Cancel   Done
add photo
First
Last
Company
➕ add phone
➕ add email
Ringtone Default >
Vibration Default >

◪ **Figure 1.3: When was the last time you used a form interface? What was it for?**

1 A list of options will appear on the screen for the user to select.

CHOOSE AN OPTION
CASH WITH RECEIPT
...ASH
...ALANCE ...N SCREEN
PRINTED BALANCE
PRINT MINI STATEMENT
CHANGE PIN NUMBER
...DEPOSIT
TRANSFER

2 The user selects the option they want by pressing a button.

◪ **Why do cash machines use a menu- rather than a text-based interface?**

When would menu interfaces be used?

Menu interfaces are used when the user is either not experienced with using devices or is not expected to type in specific commands using a keyboard. Menu interfaces are also used when there is only a small range of options that the user can select.

ACTIVITY

In pairs, find an example of a text, forms and menu-based user interface.
1 For each user interface, explain its suitability for the task it is being used for.
2 Find four example uses of each type of user interface.
3 Give three benefits and drawbacks of each type of user interface.

Complex user interfaces

User interfaces that are easier to use are often complex because they need powerful hardware to make them work. This is because they have more features that allow users to interact easily with the device.

Graphical user interfaces

A graphical user interface allows users to interact with devices through windows, icons, menus and the mouse pointer.

Features of graphical user interfaces
- It's a visual interface and therefore made up of graphics.
- Users can **navigate** around the user interface logically.
- Contains different windows to show different tasks that are currently open.
- Contains icons for users to select with the mouse or touchscreen.
- Contains menus to display options for the users to select.
- Contains a mouse pointer that allows the user to select options including icons.

■ A graphical user interface used within Microsoft Windows. What other graphical user interfaces are you familiar with?

When would graphical interfaces be used?

Graphical user interfaces are common in everyday devices that have a wide range of uses such as PCs and games consoles. They are used when the functions of a device cannot be limited to a menu. They are also used when the interface needs to be easy to use, therefore allowing users to interact with a device on their own.

Sensor interfaces

Sensor interfaces have commonly been used within the home, but this technology is increasingly used in our personal devices.

Features of sensor interfaces
- They have built-in **sensors** that are constantly monitoring what is happening around the device.

- When a certain condition has been met, the interface will automatically trigger something to happen. For example, an alarm may sound if the sensor has detected somebody inside a house.

When would sensor interfaces be used?

Sensor interfaces are used when actions performed by a device need to be automatic. For example, a smartphone may automatically unlock when it detects the correct facial features of the user. These types of interfaces have little physical human interaction.

Speech interfaces

Speech interfaces on devices are becoming increasingly popular in the home and respond directly to voices and sound.

Features of speech interfaces
- They allow users to input commands using their own voice.
- They use a built-in microphone that will listen for the user to say different commands.
- They often connect to the internet to find out information.
- They respond to the user through speakers.

■ Have you ever talked to a device? How well did it understand you?

When would speech interfaces be used?

There are many reasons why speech interfaces may be used. They can be used when users may not always be able to use the mouse or keyboard to enter commands. They are also increasingly being used to make the interactions between humans and devices feel more natural.

Choosing a user interface

When choosing a user interface for a device or task, it is important to consider carefully different factors to ensure the chosen user interface is suitable. In this lesson you will learn the different factors that you should consider before choosing or designing a user interface.

Performance

The performance of a user interface is important as you need to consider how quickly it allows you to complete tasks. For example, a restaurant will get busy around lunchtime and therefore the user interface will need to enable the restaurant staff to enter customer orders quickly. This means that they will be able to serve customers efficiently and make more profit.

User requirements

The primary reason for user interfaces is to allow the user to complete tasks using a device. Therefore, you need to consider what tasks you want to perform and then consider how well the user interface performs them. It's sometimes difficult to find a user interface that will meet all your requirements. You may need to consider which requirements are the most essential and consider which user interface best meets these requirements.

Ease of use

A user interface may be efficient at completing tasks; however, if the user is not able to operate the interface easily, then they may not engage with it. If the user interface is not easy to follow, then users may choose alternative programs. You need to consider if you will be able to operate the user interface and where you can get support if you need help. The user interface needs to be **intuitive**. This means even if someone has never used the interface before, they should be able to predict how it works and navigate it with ease.

User experience

Different users will have varying levels of experience using devices. Therefore, when choosing a user interface, it is important to look at what features it has and determine how familiar features would be to users or where they could seek additional help from. A user may decide that an interface is appropriate for them if they can instantly recognise different items on the screen. Another user may decide an interface is right for them if there is a simple help menu to guide them when using new features.

Accessibility

Some users may have accessibility needs, including visual, hearing and speech needs. Developing a user interface that will meet the needs of all users is very difficult. You need to consider if the user interface already meets the user accessibility needs or if it is customisable to meet them. For example, a user may have sensitivity to screen brightness or have colour blindness.
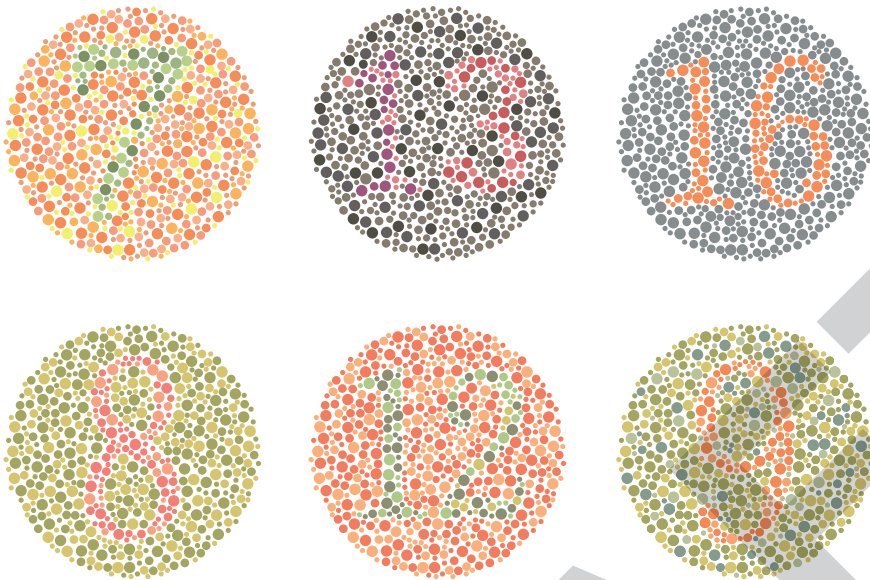
People who are colour blind may not be able to see some of the numbers. Research the different types of colour blindness to find out which colours you should avoid using together.

Storage space

The amount of storage space will often determine what type of user interface can be used and what features it will have. There needs to be a careful balance between storage space and ease of use.

- A graphical user interface is very easy to use but it requires a lot of storage space. This is because it tends to be more complex and has to store a lot of data.
- A speech-based user interface is easy to use but requires a lot of storage space as it has to store every possible human word with different pronunciations.
- A text-based interface, although not very easy to use, only takes up a very small amount of storage space.

Assessment practice

At the end of each learning outcome, the features reproduced on the following double-page spread, and as described below, will be provided to help learners with assessment preparation.

How you will be assessed

A description of the type of assessment which will be set for this learning outcome.

Tip

A hint or tip that will help learners with their assessment.

Checkpoint

This feature is designed to allow learners to assess their learning. The 'strengthen' question helps them to check their knowledge and understanding of what they have been studying, while the 'challenge' questions are an opportunity to extend their learning.

Take it further

This provides suggestions for what learners can do to further the work they've done in the practice assessment.

Assessment activity

This is a practice assessment that reflects the style and approach of an assignment brief. In Component 1, tasks in the assessment activity features will be similar to those learners should expect in their external assessment.

Learning outcomes A and B: assessment practice

How will you be assessed?

Now that you have studied all the topics in learning outcomes A and B, you will need to:

- complete a project proposal for the project brief you will be given
- create a project plan
- plan timescales for the project
- design an initial user interface of four screens
- develop a working prototype of your user interface.

You will need to show that you can select appropriate project planning tools that are suitable for the project brief. You should consider all requirements including timescales, constraints and contingencies.

Your designs must meet user requirements and use effective design principles.

You will need to demonstrate that you can manage your time effectively and follow your plan independently to create a working prototype that shows all features.

CHECKPOINT

Strengthen

- **Identify** different project methodologies that can be used to structure projects.
- **Identify** different tools that can be used to create a project plan.
- **Identify** what elements should be included in a design specification.

Challenge

- **Explain** different situations when each project methodology would be used.
- **Analyse** the suitability of different project planning techniques.
- **Assess** the effectiveness of a design specification and how effectively it incorporates standard design principles.

Project proposal mini brief

FunDayzOut is an activity park offering a range of adventure activities for the whole family. The park is split into four areas:

- Zorbing
- Skateboarding
- Quad biking
- Rock climbing.

The park requires a mobile phone app to give users information about each area of the park, including:

- safety information
- prices
- opening times
- customer reviews.

The audience for the app will be adults and families with young children.

The language used in the app should be simple and clear.

The app should be easily accessible so that it can be used by many different users.

Timescale

The app needs to be ready in 11 weeks' time.

You should split your time into two stages:

Stage 1: Design

- Research existing user interfaces
- Create a project proposal
- Produce initial designs.

Stage 2: Develop

- Create prototypes
- Implement prototypes.

Throughout the project, you should schedule regular meetings with the client to update them on progress.

ASSESSMENT ACTIVITY 1A   LEARNING OUTCOMES   A   AND   B

Create a project proposal

Create a project proposal for the activity park to include:

1 The purpose and audience of the project
2 The project requirements
3 The user requirements
4 The project constraints.

ASSESSMENT ACTIVITY 1B   LEARNING OUTCOMES   A   AND   B

Create a project plan

Create a project plan for the activity park to show:

1 Timescales, including the different tasks and subtasks
2 Key milestones
3 Task dependencies.

ASSESSMENT ACTIVITY 2   LEARNING OUTCOMES   A   AND   B

Create user interface designs

Create user interface designs for **four** different screens. Each screen should focus on **one** area of the activity park:

- Zorbing
- Skateboarding
- Quad biking
- Rock climbing.

The user interface should:

- be easy to use
- use appropriate design principles
- include different accessibility features.

ASSESSMENT ACTIVITY 3   LEARNING OUTCOMES   A   AND   B

Create a prototype of your user interface

Use your designs from activity 2 to produce your user interface. There should be a screen for each area of the activity park:

- Zorbing
- Skateboarding
- Quad biking
- Rock climbing.

TIPS

- Remember to carefully consider both the project requirements and user requirements. You can do this by regularly referring to the project brief.

TIPS

- Divide the project up into different tasks and then break down the tasks even further into sub-tasks.
- Write the tasks and sub-tasks in order. Remember to consider the task dependencies.

TIPS

- Remember to fully consider the different groups of users and ensure that suitable accessibility features are included.
- Carefully consider the design visualisation, including the input and output screens.

TIPS

- Make appropriate use of different design principles.
- Avoid cluttered screens. You could make use of tip text and clear labels.
- Check your prototype works.

TAKE IT FURTHER

Identify which project methodology would be used to create the activity park project. Justify why this is the most suitable methodology to complete the project.

You need to give the advantages of your chosen methodology and the disadvantages of alternative methodologies.

Contents

To help you with your planning, we have reproduced on the following pages the full contents list of the *Digital Information Technology Student Book* 2nd Edition.

Each double-page spread in the book represents a one-hour lesson. Each Component subheading in the contents list therefore represents a one-hour lesson. This means that you can use this contents list to plan out how the learning can be spread over the class or contact time you have available.

Contents

Acknowledgements